Student Learning Map
Unit 6

COORDINATE GEOMETRY

Mathematics 1
MM1G1a,b,c,d,e

Key Learning(s):

1. Algebraic formulas can be used to find measures of distance on the coordinate plane.
2. The coordinate plane allows precise communication about graphical representations.
3. The coordinate plane permits use of algebraic methods to obtain geometric results.

Unit Essential Question(s):

How do algebra and geometry work together within the coordinate plane?

Optional Instructional Tools: Graphing Calculator, Geometer's Sketchpad

Concept: 1

Distance

Lesson Essential Questions

1. How would you derive the distance formula?

2. How would you find the distance between two points?
3. How would you find the distance between a point and a line?

Vocabulary

Concept: 2

Midpoint

Lesson Essential Questions
1. How do I find the midpoint?

Vocabulary
1. Midpoint

Concept: 3

Verifying properties of triangles and quadrilaterals using coordinate plane.

Lesson Essential Questions

1. How do we use the coordinate plane to verify properties of triangles and quadrilaterals?

Vocabulary

Math I Unit 6 Coordinate Geometry

Notes:
1. Use Pythagorean Theorem to derive the Distance Formula.

2. Theorem: The shortest segment joining a point to a line is the perpendicular segment.

Notes:

Notes:
1. Theorem: Either diagonal separates a parallelogram into two congruent triangles.
2. Theorem: The diagonals of a parallelogram bisect each other.
3. Theorem: The segment between the mid-points of two sides of a triangle is parallel to the third side and half as long as the third side.
4. Theorem: In a rhombus, the diagonals are perpendicular to one another.
5. Look at lengths of diagonals, slopes of diagonals, midpoints of diagonals in quadrilaterals.
6. How are the 4 triangles related that are formed by the diagonals of a quadrilateral? (Similar, congruent, or neither)

Mathematics I
Unit 6 Concept 1
Acquisition Lesson—Coordinate Geometry
Session 1

Essential Question:

How would you derive the distance formula?

Activating Strategies: (Learners Mentally Active)

Meeting at the Coffee Shop Activator

Students will work in collaborative pairs or small groups to complete the activator. The activator reminds the students of the Pythagorean Theorem.

Acceleration/Previewing: (Key Vocabulary)

Math 1 Support: Pythagorean Theorem practice worksheet

Maintain vocabulary: Hypotenuse, legs, right angle, Pythagorean Theorem, x-axis, y-axis

Teaching Strategies: (Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)

Task:

- Students will work in small groups of four to complete the Distance Formula Investigating Task.
- The teacher will monitor the progress of each group and help to lead the students to the answers with probing questions.
- After each group has completed the task, they will put the findings on chart paper. The groups will present the task to the class and act as "experts" to answer questions.
- After each group has presented, the teacher will get the group together and address any misconceptions that he/she noticed during the student presentations.

Distributed Guided Practice/Summarizing Prompts: (Prompts Designed to Initiate Periodic Practice or Summarizing)

You are a land developer looking to start a new subdivision. Your subdivision is rectangular and you must have security lights at all four corners. The subdivision is 12,000 feet in length and 5,000 feet in width. You desire no electrical wires to be seen; therefore, electrical wiring will be underground. The cost of electrical wire is $2.50 per foot to be buried underground. As the land developer, you must keep cost down as much as possible. The electrical company's representative requires you to make a grid using a coordinate system to layout where you would like the lights. Using the distance formula, explain why you know that it will require 13,000 feet to reach diagonally from the northwest corner to the southeast corner. Also, tell the cost of running that diagonal line. Verify your calculations using the Pythagorean Theorem.

Summarizing Strategies: Learners Summarize & Answer Essential Question

Give students a piece of graph paper. Ask them to plot two random points and find the distance between them. Then, create a right triangle with their two points at the acute angles and use the Pythagorean Theorem to verify the length of their segment.

- Coffee Shop Activating Worksheet
- Distance Formula Investigating Task
- Chart Paper
- Graph Paper
- Support: Pythagorean Theorem practice worksheet

Unit 6 Geometry
Distance Formula – Pythagorean Practice
Math 1 Support

Simultaneous Round/Table
Students divided into teams of 4 members.
Each team will work in clock-wise direction.

1. To begin, Teammate 1 writes problem 1, Teammate 2 writes problem 2, Teammate 3 writes problem 3, and Teammate 4 writes problem 4 on his/her paper.
2. Each teammate writes the Pythagorean formula on his/her paper, initials the formula, and passes the paper to the next person.
3. Each teammate checks the previous work, coaches and/or praises his/her teammate. Each teammate substitutes the appropriate values into the Pythagorean formula, initials the equation, and passes the paper to the next person.
4. Each teammate checks the previous work, coaches and/or praises his/her teammate. Each teammate solves the equation on his/her paper putting his/her answer in simplest radical form, initials the work, and passes the paper to the next person.
5. Each teammate checks all the previous work. Each teammate signs the paper indicating his/her approval of all work done.

Answers:
1. $2\sqrt{10}$
2. $10\sqrt{3}$
3. $4\sqrt{5}$
4. 8

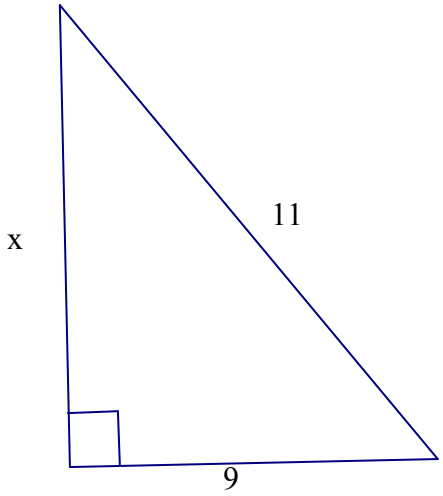
Student Directions

1. Write the Pythagorean formula on your paper, initial the formula, and pass the paper to the next person in a clockwise direction.

2. Check the previous work and coach and/or praise your teammate. Substitute the appropriate values into the Pythagorean formula, initial the equation, and pass the paper to the next person.

3. Check the previous work and coach and/or praise your teammate. Solve the equation on your paper, putting your answer in simplest radical form. Initial the work, and pass the paper to the next person.

4. Check all the previous work and coach and/or praise your teammate. Sign the paper, indicating your approval of all work done.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11
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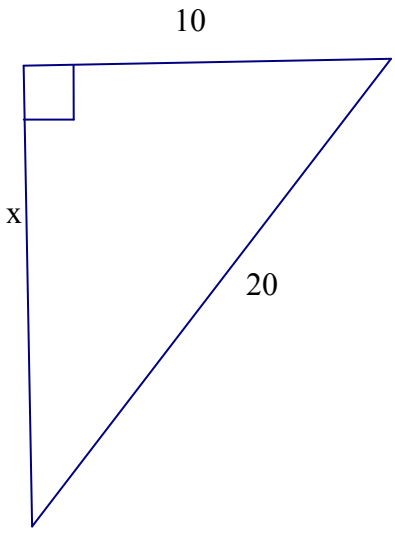
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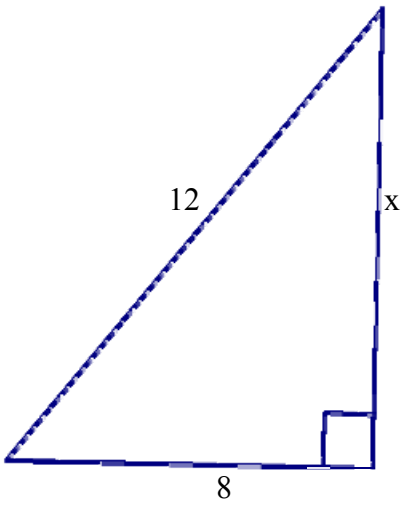
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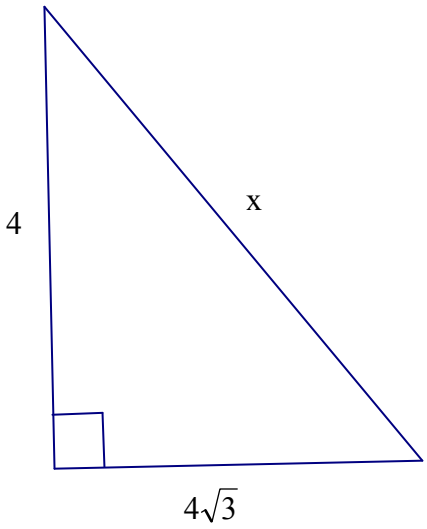
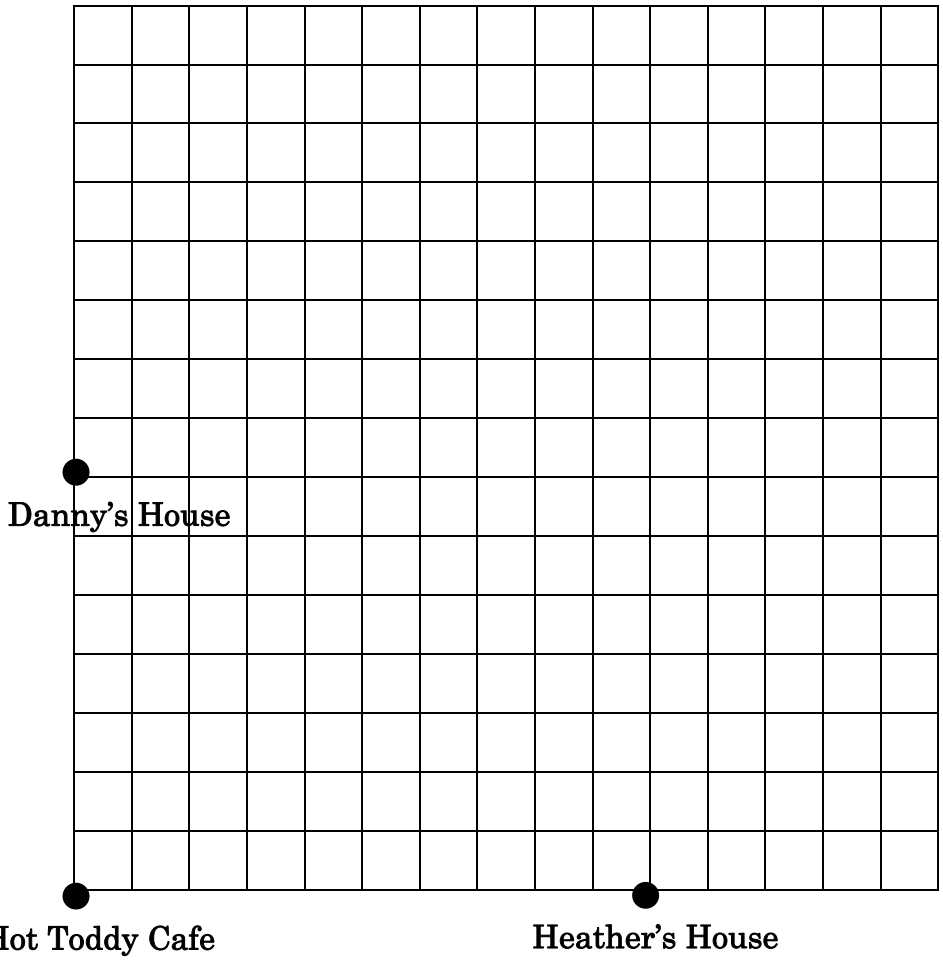

4
x
$4\sqrt{3}$

Distance Concept

Activating Strategy

Two friends, Danny and Heather, live in a city in which the streets are laid out in a grid system.
Danny lives on Elizabeth Street and Heather lives on Mary Street as shown. The two friends often meet at the coffee shop, Hot Toddy Cafe. Each grid square represents one city block.



A. How far in blocks does Danny walk to get to the coffee shop?

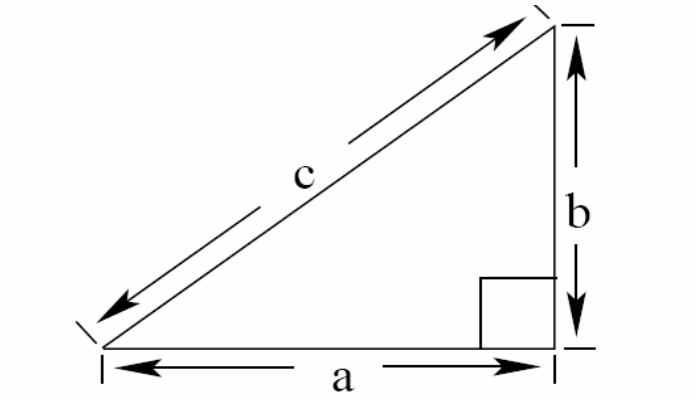
B. How far in blocks does Heather walk to get to the coffee shop?

C. Danny wants to meet Heather at his house so that they can go to a baseball game together. Heather can either walk from her house to the coffee shop and then to Danny's house, or she can walk directly to Danny's house. Which distance is shorter? Explain your reasoning.

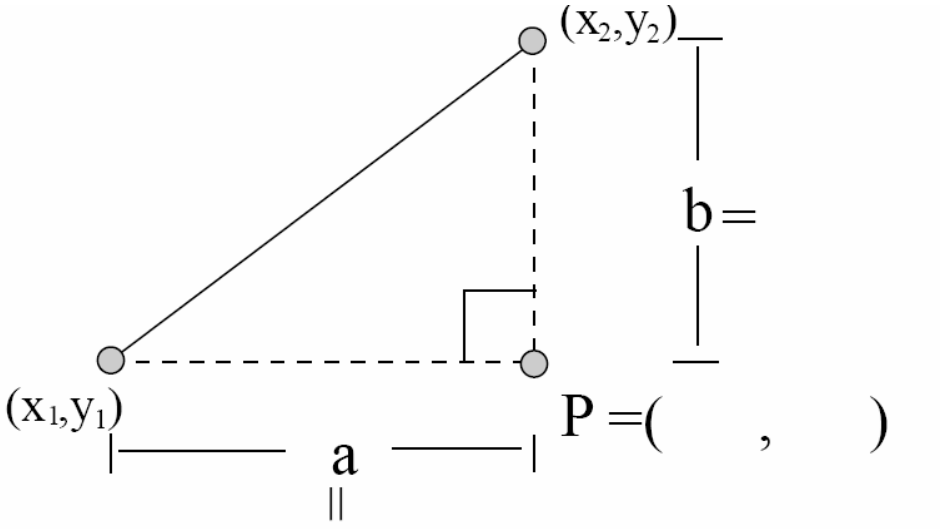
Distance Formula Investigating Task

The goal of this worksheet is to be able to derive the formula for the distance between two points.

1. What is the Pythagorean Theorem? (*Hint: It involves the sides of the right triangle below.*)



2. We want to find a formula for the distance between the two points (x_1, y_1) and (x_2, y_2). First, we draw a picture of the line segment from (x_1, y_1) to (x_2, y_2). Then we construct a right triangle using this line segment as the hypotenuse (see the diagram below).



   a. Our goal is to find the length of the line segment from (x_1, y_1) to (x_2, y_2). Label this distance *d* in the above diagram.

b. What are the coordinates of points P? Fill in these coordinates in the above diagram.

c. What is the distance *a*? Put this value on the diagram. (*Hint: It will involve* x_1 *and* x_2*.)*

d. What is the distance *b*? Put this value on the diagram. *(Hint: It will involve* y_1 *and* y_2.)

3. Set up the Pythagorean Theorem with the information you put in the diagram in Step 2.

4. Solve the above equation for *d*.

5. What does the equation you found in step 4 represent?

Mathematics 1
Unit 6 Concept 1
Acquisition Lesson—Coordinate Geometry
Session 2

Essential Question:

How would you derive the distance formula?

Acceleration/Previewing: (Key Vocabulary)

Teacher will review with the students the activating strategy from the previous lesson.

Teaching Strategies: (Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)

Continue Distance Formula Investigating Task from the day before.

Distributed Guided Practice/Summarizing Prompts: (Prompts Designed to Initiate Periodic Practice or Summarizing)

Continue from previous session.

Summarizing Strategies: Learners Summarize & Answer Essential Question

Continue from previous session.

- Coffee Shop Activating Worksheet
- Distance Formula Investigating Task
- Chart Paper
- Graph Paper
- Support: Pythagorean Theorem practice worksheet

Mathematics 1
Unit 6 Concept 1
Acquisition Lesson—Coordinate Geometry
Session 3

Essential Question:

How would you find the distance between two points?

Activating Strategies: (Learners Mentally Active)

Coordinate Popcorn Activity (See attached document)

Acceleration/Previewing: (Key Vocabulary)

Math 1 Support: Simplifying Radicals

Teaching Strategies: (Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers

Task:

- Students will be grouped in collaborative pairs/or small groups.
- They will complete the Passport Learning Task. Directions are included with the task.
- After the task, the teacher will initiate a class discussion of the task and state the purpose of the task.

Distributed Guided Practice/Summarizing Prompts: (Prompts Designed to Initiate Periodic Practice or Summarizing)

The task itself will act as the distributed practice.

Summarizing Strategies: Learners Summarize & Answer Essential Question

Students will write a paragraph explaining how to use the distance formula and what each part means.

- Coordinate Popcorn Activity Sheet
- Simplifying Radicals worksheet (math support)
- Passport Task Worksheet

Math I Unit 6 Coordinate Geometry

Coordinate Popcorn Activity

Each student will be given an index card with one coordinate point labeled with the points A-Z.

Teacher will ask for the length of the following segments. Students with the given endpoints will work as partners to find the distance between their points. Each partner set will show their work on a giant graph paper pad. They will plot their points, draw the segment, and find the distance. Students will also create the triangle that would use their segment as the hypotenuse to show how the Pythagorean Theorem will also apply.

A (8,3)
B (10, 4)
C (2,7)
D (5, 6)
E (9,6)
F (4,1)
G (0,4)
H (8,-2)
I (-5,3)
J (1,2)
K (1,-6)
L (-2,4)
M (8,-7)
N (4,-3)
O (-10,-2)
P (6,5)
Q (-1,-8)
R (-5,-2)
S (2,4)
T (2,-1)
U (-3,2)
V (7,2)
W (3,2)
X (3,-9)
Y (4,1)
Z (5,5)

AB = 2.24
CD = 3.16
EF = 7.07
GH = 10
IJ = 6.08
KL = 10.44
MN = 5.66
OP = 17.46
QR = 7.21
ST = 5
UV = 10
WX = 11
YZ = 4.12

Math 1 Support
Simplifying Radicals

1. $\sqrt{138}$

2. $\sqrt{56.25}$

3. $\sqrt{128}$

4. $\sqrt{720}$

5. $\sqrt{84.25}$

6. $\sqrt{26.25}$

7. $\sqrt{37.5}$

8. $\sqrt{6.25}$

9. $\sqrt{31.25}$

10. $\sqrt{14.5}$

Math I Unit 6 Coordinate Geometry
Simplifying Radicals Answer Key

1. $\sqrt{138} = \sqrt{138}$
2. $\sqrt{56.25} = \frac{15}{2}$
3. $\sqrt{128} = 8\sqrt{2}$
4. $\sqrt{720} = 12\sqrt{5}$
5. $\sqrt{84.25} = \frac{\sqrt{337}}{2}$
6. $\sqrt{26.25} = \frac{\sqrt{105}}{2}$
7. $\sqrt{37.5} = \frac{5\sqrt{6}}{2}$
8. $\sqrt{6.25} = \frac{5}{2}$
9. $\sqrt{31.25} = \frac{5\sqrt{5}}{2}$
10. $\sqrt{14.5} = \frac{\sqrt{58}}{2}$

Passport Learning Task

You have won a vacation to travel to Europe, and the trip begins in 10 days. There are many items to get ready. One of the most important factors is getting your passport in on time and making sure there are no mistakes. In the mail, you receive your passport and it has your birth year as 1890. This is a huge mistake that must be corrected before you will be allowed to leave the country.
Your ONLY option is to travel to one of the thirteen Passport Agencies in the United States, stand in line, and get your information corrected on your passport.

Thankfully, you will not have to drive a vehicle to one of the Passport Agencies. One of your friends has just gotten his pilot license. He has offered to take you to one of the agencies, only charging you the fuel cost of the trip, which is currently $3.50 per gallon. The only thing you need to do is let him know which location you would like to go to.

First, you must find the distance between your house and each of the thirteen Passport Agency locations. If the USA was plotted onto a coordinate plane with the origin located in Nashville, TN, the following list of coordinate points would represent the location of each of the Passport Agency locations. Using the points listed, find the distance between your hometown in Georgia at (2,-2), and each of the Passport Agency locations to fill in the chart below. You must give your answer in two forms, the simplified radical and an estimated decimal to three decimal places.

Name of City	Ordered Pair	Distance From Home (Simplified Radical)	Distance From Home (Approximated Decimal)
Seattle, WA	(-12,7)		
San Francisco, CA	(-13,2.5)		
New York, NY	(4.5,3)		
Philadelphia, PA	(3.5,3)		
Boston, MA	(5,4)		
Chicago, IL	(-1,2.5)		
Aurora, CO	(-7,1.5)		
Norwalk, CT	(4.5,3.5)		
Houston, TX	(-3.5,-3)		
Los Angeles, CA	(-12,0)		
Washington, D.C.	(3.5,1.5)		
Miami, FL	(3,-4.5)		
New Orleans	(-1,-3.5)		

Which of the agencies is the closest and will cost you the least amount of money? Explain your answer.

Passport Learning Task Key

Name of City	Ordered Pair	Distance From Home (Simplified Radical)	Distance From Home (Approximated Decimal)
Seattle, WA	**(-12,7)**	$\sqrt{277}$	16.643
San Francisco, CA	**(-13,2.5)**	$\frac{3\sqrt{109}}{2}$	15.660
New York, NY	**(4.5,3)**	$\frac{5\sqrt{5}}{2}$	5.590
Philadelphia, PA	**(3.5,3)**	$\frac{\sqrt{109}}{2}$	5.220
Boston, MA	**(5,4)**	$3\sqrt{5}$	6.708
Chicago, IL	**(-1,2.5)**	$\frac{3\sqrt{13}}{2}$	5.408
Aurora, CO	**(-7,1.5)**	$\frac{\sqrt{373}}{2}$	9.657
Norwalk, CT	**(4.5,3.5)**	$\frac{\sqrt{146}}{2}$	6.042
Houston, TX	**(-3.5,-3)**	$\frac{5\sqrt{5}}{2}$	5.590
Los Angeles, CA	**(-12,0)**	$10\sqrt{2}$	14.142
Washington, D.C.	**(3.5,1.5)**	$\frac{\sqrt{58}}{2}$	3.808
Miami, FL	**(3,-4.5)**	$\frac{\sqrt{29}}{2}$	2.693
New Orleans	**(-1,-3.5)**	$\frac{3\sqrt{5}}{2}$	3.354

Mathematics 1
Unit 6 Concept 1
Acquisition Lesson—Coordinate Geometry
Session 4

Essential Question:

How would you find the distance between a point and a line?

Activating Strategies: (Learners Mentally Active)

Equations of lines Worksheet (parallel and perpendicular lines)

Acceleration/Previewing: (Key Vocabulary)

Math 1 Support: Writing Equations of Lines Worksheet

Maintain Vocabulary: slope, slope-intercept form, point-slope form

Teaching Strategies: (Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)

Task:

- Students will be divided into small groups for the learning task.
- Students will complete the Euler's Village Learning Task from the Frameworks. There are additional instructions on the teacher's edition.
- After the completion of the task, the groups will write their findings of the task on chart paper and present to the class.
- After all groups have presented, the teacher will initiate a conversation of the groups' findings and address any misconceptions.

Distributed Guided Practice/Summarizing Prompts: (Prompts Designed to Initiate Periodic Practice or Summarizing)

Euler's Task…

Summarizing Strategies: Learners Summarize & Answer Essential Question

In a paragraph, explain how you can find the distance between a point and a line.

- Equations of Lines Activator
- Writing Equations of Lines math support worksheet
- Euler's Task
- Graph Paper
- Chart Paper

MATH SUPPORT I

TOPIC: WRITING EQUATIONS OF LINES:

Write an equation of a line in slope-intercept form (y = mx + b) given the following information.

A. Given one point and the slope:

1. (-3, 2) m = 2

2. (2, -4) m = -4

B. Given two points:

3. (-3, -4) and (-2, -5)

4. (2, 5) and (-1, -1)

5. Find the equation of the line passing through the point (-2, 3) that is parallel to the equation of the line 4x + 2y = 6.

6. Find the equation of the line passing through the point (5,1) that is perpendicular to the equation of the line x + y = 6.

MATH SUPPORT I

TOPIC: WRITING EQUATIONS OF LINES:

Write an equation of a line in slope-intercept form (y = mx + b) given the following information.

A. Given one point and the slope:

1. (-3, 2) m = 2 **Answer: y = 2x + 8**

2. (2, -4) m = -4 **Answer: y = -4x + 4**

B. Given two points:

3. (-3, -4) and (-2, -5) **Answer: y = -x - 7**

4. (2, 5) and (-1, -1) **Answer: y = 2x + 1**

5. Find the equation of the line passing through the point (-2, 3) that is parallel to the equation of the line 4x + 2y = 6.

Answer: y = -2x - 1

6. Find the equation of the line passing through the point (5,1) that is perpendicular to the equation of the line x + y = 6.

Answer: y = x - 4

Math I Unit 6 Coordinate Geometry

Parallel and Perpendicular Line Activator

Write an equation of the line passing through the given point that is parallel and that is perpendicular to the given line.

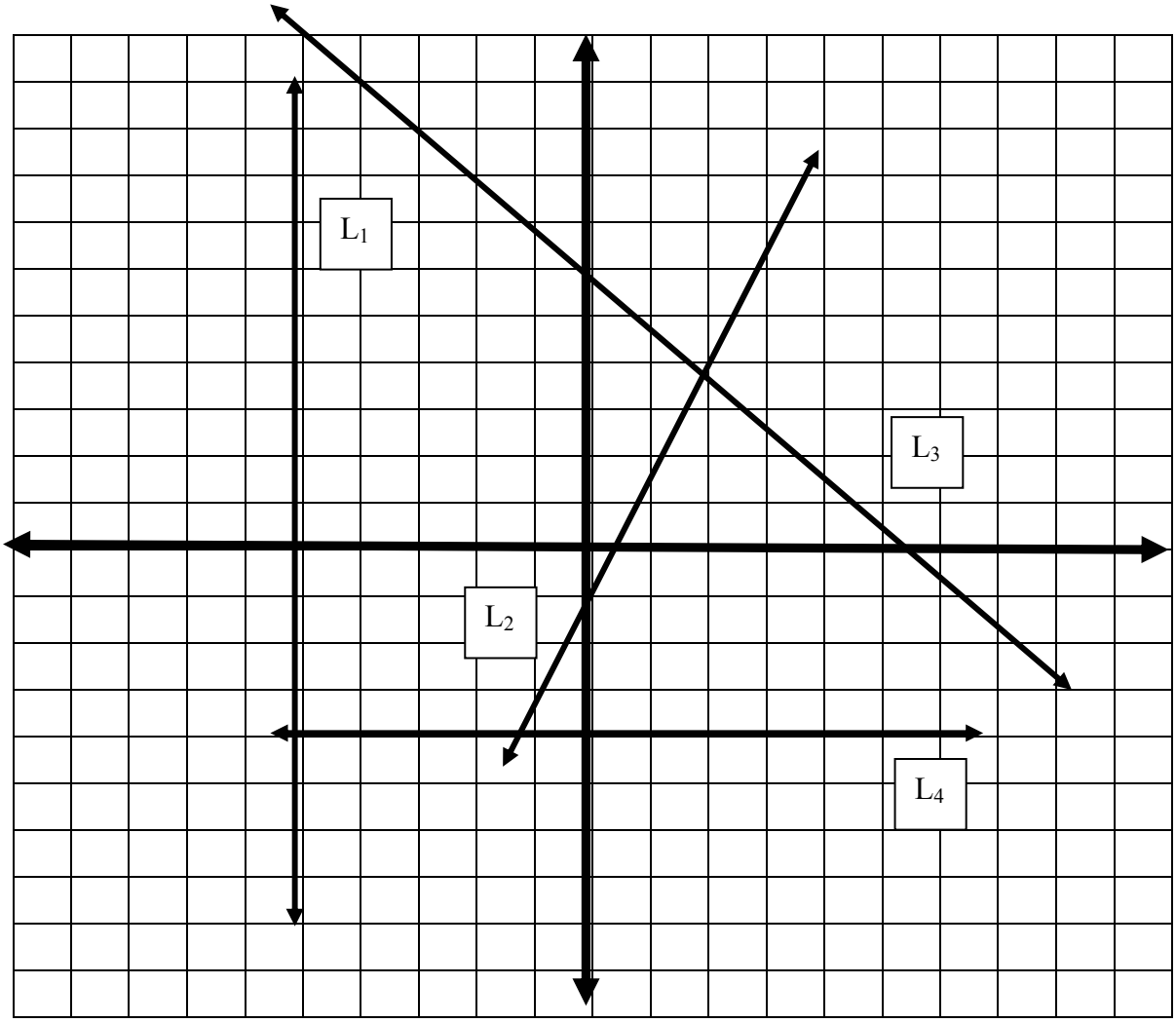
Parallel Line Equation Perpendicular Line Equation

1. $y = 3x - 4$ (-3,-3)

2. $y = 5x + 4$ (1,1)

3. $y = -\frac{2}{3}x + 1$ (2,-4)

4. $y = -x + 9$ (2,5)


L1
L2
L3
L4

Euler's Village Learning Task

You would like to build a house close to the village of Euler. There is a beautiful town square in the village, and the road you would like to build your house on begins right at the town square.

The road follows an approximately north east direction as you leave town and continues for 3,000 feet. It passes right by a large shade tree located approximately 200 yards east and 300 yards north of the town square. There is a stretch of the road, between 300 and 1200 yards to the east of town, which currently has no houses. This stretch of road is where you would like to locate your house. Building restrictions require all houses sit parallel to the road. All water supplies are linked to town wells and the closest well to this part of the road is 500 yards east and 1200 yards north of the town square.

1. Create a representation of the road, the well, the tree, etc. (on graph paper)

2. Determine the location of the house if it was 300 yards east of town? 500 yards east of town? 1,000 yards east of town? 1,200 yards east of town? (For the sake of calculations, do not consider how far the house is from the road, just use the road to determine the coordinates of each location)

3. How far from the well would it be if the house was located on the road 300 yards east of town? 500 yards east of town? 1,000 yards east of town? 1,200 yards east of town? (For the sake of calculations, do not consider how far the house is from the road, just use the road to make calculations)

4. The cost of the piping leading from the well to the house is a major concern. Where should you locate your house in order to have the shortest distance to the well? Justify your answer mathematically.

5. If the cost of laying pipes is $225 per linear yard, how much will it cost to connect your house to the well?

6. The builder of your house is impressed by your calculations and wants to use the same method for placing other houses. Describe the method you used. Would you want him to place the other houses in the same manner?

7. Describe what the house, the road, and the shortest distance represent mathematically. Describe your method mathematically.

8. Write a formula that the builder could use to find the cost of laying pipes to any house along this road. How would you have to change your formula for another road?

Mathematics 1
Unit 6 Concept 1
Acquisition Lesson—Coordinate Geometry
Session 5

Essential Question:

How would you find the distance between a point and a line?

Activating Strategies: (Learners Mentally Active)

Continued from the previous session.

Acceleration/Previewing: (Key Vocabulary)

Continued from the previous session.

Teaching Strategies: (Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)

Continued from the previous session.

Distributed Guided Practice/Summarizing Prompts: (Prompts Designed to Initiate Periodic Practice or Summarizing)

Continued from the previous session.

Summarizing Strategies: Learners Summarize & Answer Essential Question

Continued from the previous session.

Acquisition Lesson Planning Form
Math I Unit 6 Concept 2
Session 1

Essential Question: How do I find the midpoint? MM1G1c

Activating Strategies: (Learners Mentally Active)- Brain Storm Carousel : Distance, Midpoint, Average, Median

Acceleration/Previewing: (Key Vocabulary)- Midpoint

Teaching Strategies: (Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)

1. **Have two students stand at opposite ends of the room and walk towards each other until they meet in the middle. (Play the country music song "Meet in the Middle").**
2. **Now using a number line (on floor), have students meet in the middle.**
3. **Give students graph paper and have them draw an oblique line segment of their choice. Give students a straw and have them cut the straw to the length of the line segment then fold the straw in half and use it to mark the midpoint on the line segment. Find the coordinates of the midpoint.**
4. **Use New York learning task to discover the midpoint formula.**
   Note: On #4 of this task, students may need to plot more points on graph paper and fold to find the coordinates of the midpoint to help them see that you are just finding the average of the x-coordinates and the average of the y-coordinates to find the midpoint.

For math support students: Have students practice several problems where they find the median for an even number of data.

Distributed Guided Practice/Summarizing Prompts: (Prompts Designed to Initiate Periodic Practice or Summarizing)
Distributed Guided Practice Problems (attached)

Summarizing Strategies: Learners Summarize & Answer Essential Question

Summarizer/Evaluation: Meet in the Middle Activity (attached)

Name_____**Date**_____

Homework Practice #1

Find the midpoint of the line segment with the given endpoints.

1. (14, 3), (6, 9)

2. (-11, -3), (2, -5)

3. (8, -8), (3, 5)

4. **Amusement Park** You are asked to decide where to place the Swing ride in an amusement park. It needs to be placed midway between the two largest roller coasters. In a coordinate plane, the coordinates of the first roller coaster are (500, 500) and the coordinates of the second roller coaster are (3000, 3500).

   a. Determine the coordinates of where the Swing ride should be located.

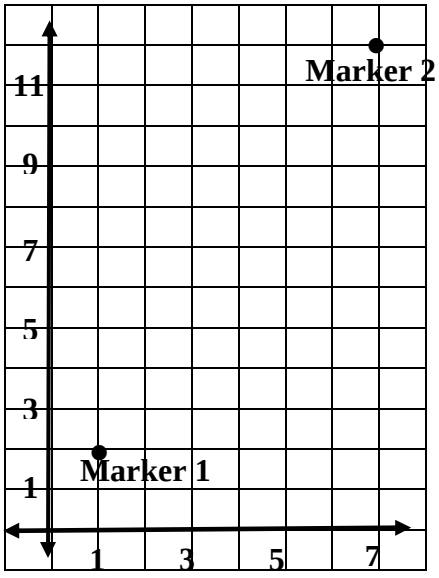
   b. Find the distance between the Swing ride and each of the roller coasters. Round your answer to the nearest foot.

5. **Hiking** You are hiking a straight-line distance between the two markers shown on the map.

   a. How far have you hiked one way? Round your answer to the nearest mile.

   b. You decide to stop halfway between the two markers to eat a snack. What are the coordinates of your location?

   c. One-quarter of the way back to your starting point, you drop your hat and have to stop to pick it up. How far are you from your starting point? Round your answer to the nearest mile. What are the coordinates of your location? Explain how you got your answer.



Key to Homework practice #1

1. (10, 6)
2. (-9/2, -4) or (-4.5, -4)
3. (11/2, -3/2) or (5.5, -1.5)
4. a. (1750, 2000)
   b. Distance between roller coaster #1 and the Swing ride: 1953 feet
      Distance between roller coaster #2 and the Swing ride: 1953 feet
5. a. d = 12 mile
   b. midpoint: (4, 7)
   c. d = 9 miles from starting point; (11/2, 19/2) or (5.5, 9.5); Explanations may vary.

Meet in the Middle Teacher's Copy

(Use with Session 1)

Play the song "Meet in the Middle" while the students complete the following summarizing activity.

This activity could be used to form cooperative groups of four students. For example in a class of 28, you will need 7 different midpoints.

Hang the Midpoints from the ceiling or as an alternative method the students can write their midpoint on their card and see if any other students have the same midpoint.

Each student will be given two ordered pairs representing the endpoints of a line segment. Students will determine the midpoint of the segment.

If the midpoints are hanging from the ceiling, the students will go stand under their midpoint.

1.	(4,2) (6,1)	Midpoint
2.	(-4,5) (14,-2)	
3.	(0,6) (10,-3)	(5, 3/2)
4.	(15,-6) (-5,9)	
5.	(4,-6) (-8,12)	
6.	(-4,5) (0, 1)	(-2,3)
7.	(3, 10) (-7, -4)	
8.	(12, 3) (-16, 3)	
9.	(6,8) (-4,0)	
10.	(8,0) (-6,8)	(1,4)
11.	(1,2) (1,6)	
12.	(-3,10) (5, -2)	
13.	(-6,5) (0,-4)	
14.	(-12,3) (6,-2)	(-3, ½)
15.	(-18, -6) (12,7)	
16.	(-2,4) (-4,-3)	

17. (12,6) (0,-7)
18. (1,8) (11,-9) (6, -½)
19. (0,-3) (12,2)
20. (-3,4) (15,-5)

21. (2,-10) (-2,-4)
22. (4,-20) (-4,6) (0,-7)
23. (-3,0) (3,-14)
24. (-5,2) (5,-16)

25. (6,-5) (-2,-3)
26. (10,-6) (-6,-2) (2,-4)
27. (-10,10) (14,-18)
28. (-16,-9) (20,1)

(4,2) (6,1)

(-4,5) (14,-2)

(0,6) (10,-3)

(15,-6) (-5,9)

(4,-6) (-8,12)

(-4,5) (0, 1)

(3, 10) (-7, -4)

(12, 3) (-16, 3)

(6,8) (-4,0)

(8,0) (-6,8)

(1,2) (1,6)

(-3,10) (5, -2)

(-6,5) (0,-4)

(-12,3) (6,-2)

(-18, -6) (12,7)

(-2,4) (-4,-3)

(12,6)

(0,-7)

(1,8)

(11,-9)

(0,-3)

(12,2)

(-3,4)

(15,-5)

(2,-10) (-2,-4)

(4,-20) (-4,6)

(-3,0) (3,-14)

(-5,2) (5,-16)

(6,-5) (-2,-3)

(10,-6) (-6,-2)

(-10,10)(14,-18)

(-16,-9) (20,1)

Acquisition Lesson Planning Form
Math I Unit 6 Concept 2
Session 2

Essential Question: How do I find the midpoint? MM1G1c

Activating Strategies: Word Splash: Center, Diameter, Radius, Circle, Midpoint, and Distance.

Acceleration/Previewing: (Key Vocabulary) Midpoint

Teaching Strategies: (Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)

Extending/Refining Midpoint Activity

Note: For Math Support: When finding the other endpoint for a line segment given the midpoint and one endpoint, have students graph the points and extend the segment towards the point where they predict the other endpoint will lie. This will help them avoid the error of just using the midpoint formula as if they were finding the midpoint. Possible points to use: 1. (-3, -2) and (-1,2) 2. (1, -4) and (4,2) 3. (5,2) and (7, 1).

Distributed Guided Practice/Summarizing Prompts: (Prompts Designed to Initiate Periodic Practice or Summarizing)
Midpoint/Distance Roundtable Activity

Summarizing Strategies: Learners Summarize & Answer Essential Question
Write a letter to the absent student explaining how to find the midpoint of a line segment.

MIDPOINT/DISTANCE ROUNDTABLE Teacher Directions
Materials needed: graph paper

1. Place students in cooperative groups of 4.
2. Teammate 1 writes problem 1 on his paper. Teammate 2 writes problem 2. Teammate 3 writes problem 3, and Teammate 4 writes problem 4.
3. Each teammate graphs the triangle ABC, identifies the hypotenuse, and finds the midpoint of the hypotenuse and labels it D. They initial their work and pass the paper to the next person in a clockwise direction.
4. On the paper just received each teammate checks the previous teammates work. Discuss any discrepancies. Find distance AD. They initial their work and pass the paper to the next person in a clockwise direction.
5. On the paper just received each teammate checks the previous teammates work. Discuss any discrepancies. Find distance BD. They initial their work and pass the paper to the next person in a clockwise direction.
6. On the paper just received each teammate checks the previous teammates work. Discuss any discrepancies. Find distance CD.
7. On the paper just received, each student checks the previous work, discusses discrepancies, and signs the paper indicating his approval of all the work done.
8. As a group the students should discuss their results and summarize their findings in one complete sentence. Students should discover that the midpoint of the hypotenuse of a right triangle is equidistant from the 3 vertices.

PROBLEMS:

1. A (0,4), B (2,2), C (4,4)

2. A (1,1), B (6,11), C (5,1)

3. A (1,2), B (7,2), C (7,10)

4. A (-2,-1), B (3,-1), C (3,2)

Math I Unit 6 Coordinate Geometry

MIDPOINT/ DISTANCE ROUNDTABLE Student Directions

Step 1:

- Draw triangle ABC.
- Identify the hypotenuse.
- Find the midpoint of the hypotenuse and label it D.
- Initial your work and pass your paper 1 person in a clockwise direction.

Step 2:

- Check the previous teammate's work and discuss any discrepancies. Make corrections if necessary.
- Find distance AD.
- Initial your work and pass your paper 1 person in a clockwise direction.

Step 3:

- Check the previous teammate's work and discuss any discrepancies. Make corrections if necessary.
- Find distance BD.
- Initial your work and pass your paper 1 person in a clockwise direction.

Step 4:

- Check the previous teammate's work and discuss any discrepancies. Make corrections if necessary.
- Find distance CD.
- Initial your work and pass your paper 1 person in a clockwise direction.

Step 5:

- On the paper just received, check the previous work, discuss discrepancies, and sign the paper indicating your approval of all the work done.

Step 6:

- As a group, discuss your results and summarize your findings in one complete sentence.

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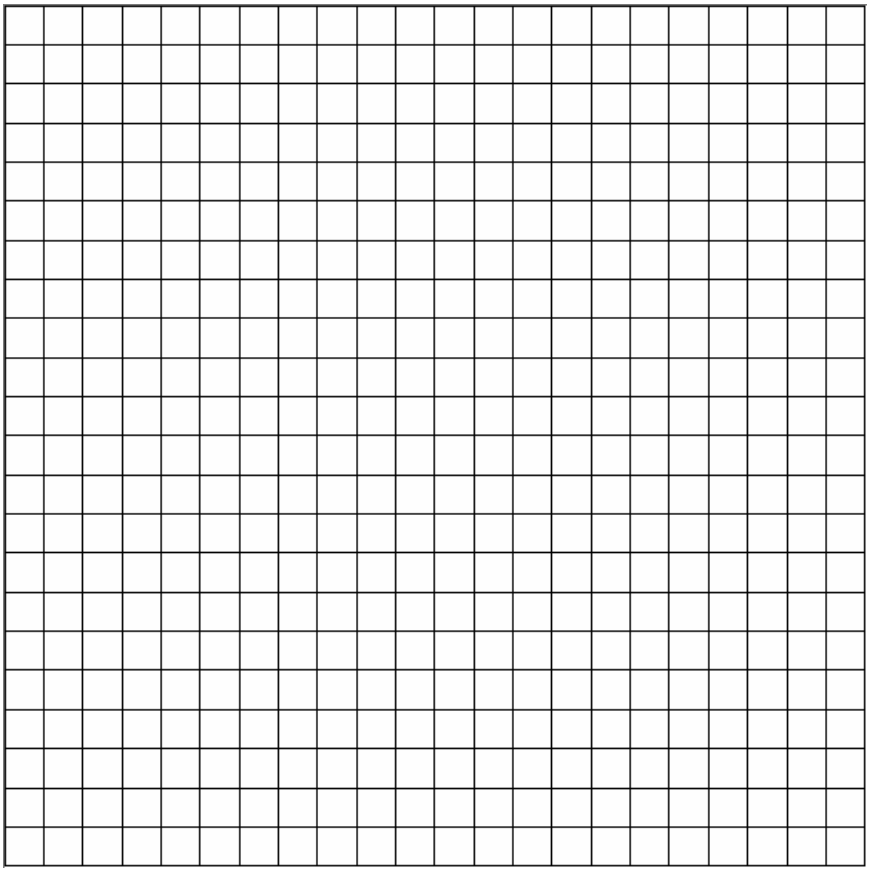
Extending/Refining Midpoint Activity

The midpoint and an endpoint of a line segment are given. Find the other endpoint.

1. Midpoint (-4,6) Endpoint (2,1)

2. Midpoint (-3,3) Endpoint (-4, -2)

3. Given A (-4, 5) and B (0, 1), draw the circle such that line segment AB is the diameter of the circle.



4. (2, 3) and (-4, -5) lie on a line segment. One of these points is an endpoint and the other is the midpoint. Find the other endpoint of the segment. Verify your answer in more than one way.

Solutions

1. (8, -4)
2. (-2, 8)
3. (-2,3)
4. There are two possible solutions. The endpoint can be (-4, -5) or (5, 7). Students may verify graphically and by using the midpoint formula.

Acquisition Lesson Planning Form

Key Standards addressed: MM1G1e

Time allotted for this Concept: 8 Sessions

Unit 6 Concept 3: Properties of Triangles and Quadrilaterals

Essential Question: <u>LESSON 1 VERIFYING PARALLELOGRAMS (3 Sessions)</u>
What do the diagonals of a parallelogram do to the parallelogram or to each other?

Activating Strategies: (Learners Mentally Active)
KWL: Have students recall properties of parallelograms (make note of any special parallelograms). When completed, have them record the information in their flip chart (foldable)

Acceleration/Previewing: (Key Vocabulary)
Midpoint, Distance Formula, X-axis, Y-axis, Origin, Coordinate, Ordered Pair, Slope, Opposite sides, Consecutive sides, Opposite angles, Consecutive angles, Angle Bisector.

Teaching Strategies: (Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)

(GO) Parallelograms

Pairs shared:

- First, have students work together to complete *Handout 1 Lesson 1*.
- Make sure students are using prior knowledge to explain their findings on proving the parallelogram constructions.

Use coordinate geometry:

- Use distance formula to show congruency.
- Use slope to show lines are parallel or perpendicular.

Distributed Guided Practice/Summarizing Prompts: (Prompts Designed to Initiate Periodic Practice or Summarizing)

Prompts:

- What are angle bisectors?
- What do you know about opposite angles and consecutive angles?
- The opposite sides of a parallelogram are _____.
- Are there any special parallelograms?
- How can you use the properties to find missing values of a parallelogram?

Have students practice finding missing parts using coordinate geometry. See Using Coordinate Geometry Handout and Parallelogram Handout (Answer document available)

Summarizing Strategies: Learners Summarize & Answer Essential Question

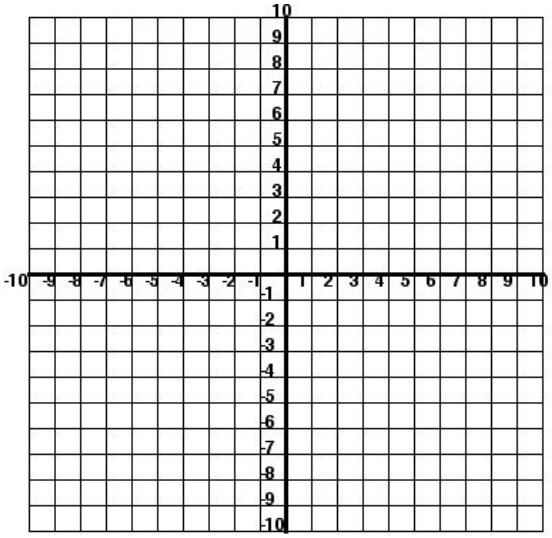
Ticket Out The Door:

Have the students complete the following question:

Determine whether the statements below are true or false. Explain your finding using prior knowledge and topics learned in this lesson.

1. All rectangles are squares.
2. All squares are rectangles.
3. All rectangles are parallelograms.
4. All squares are rhombi.
5. All quadrilaterals are parallelograms.

PROPERTIES OF PARALLELOGRAMS INVESTIGATION



1. Draw a parallelogram with two sides of length 5 inches, two sides of length 3, two angles of measure 60^0 and two angles of measure 120^0.
2. Label the parallelogram angles *A, B, C, D* and label the coordinates.
3. Construct the diagonal that connects vertices *A* and *C*.
4. How does *m<ACD* compare to *m<CAB?*

5. How does *m<BCA* compare to *m<DAC?* Explain your reasoning.

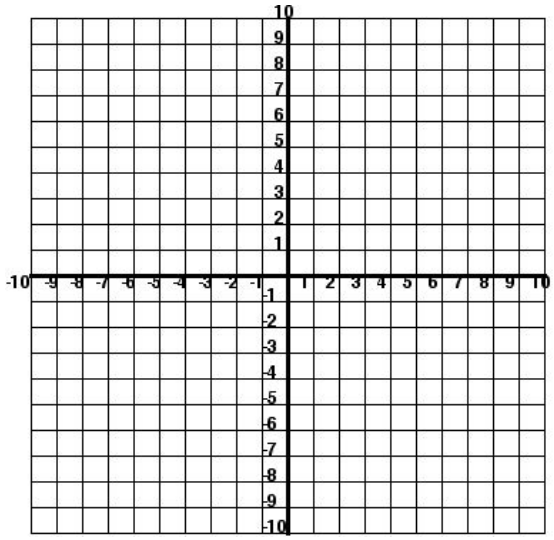
6. Can you conclude information about $\triangle$ *BCA* and $\triangle$ *DCA*? Explain.

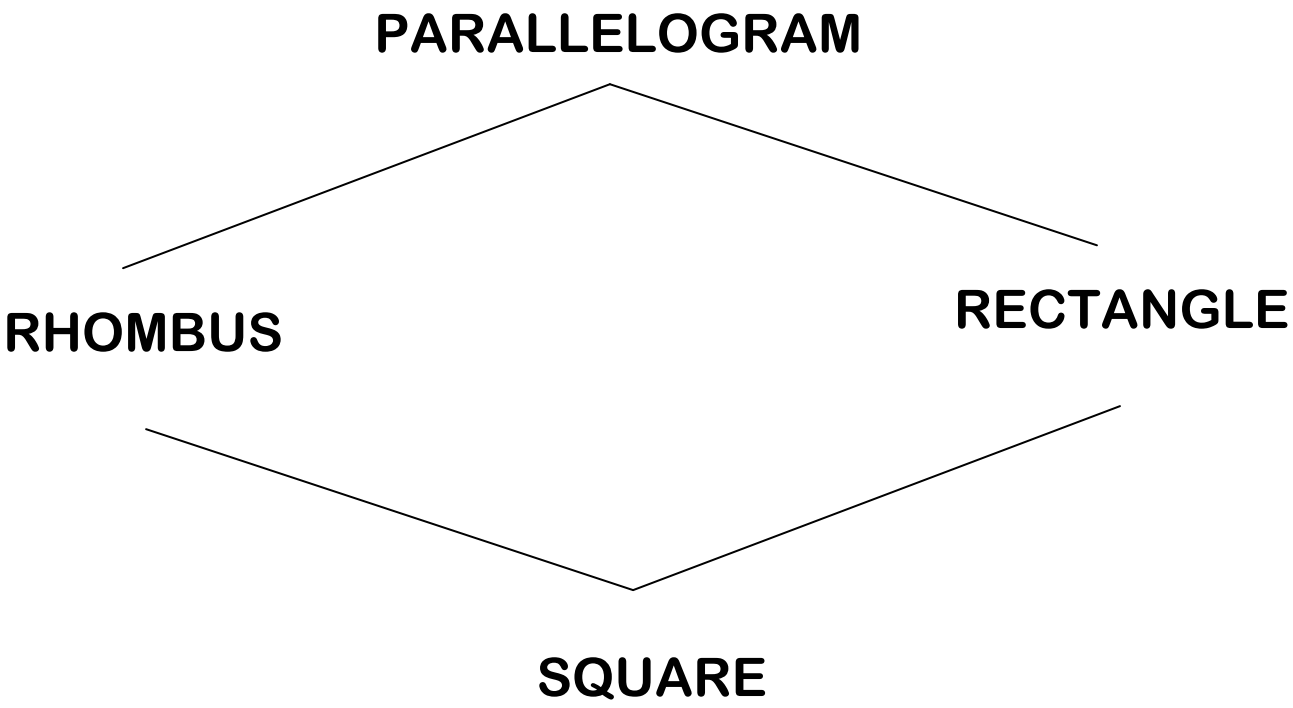
7. What can you conclude about the opposite sides of a parallelogram? Explain.

8. What can you conclude about <*B* and <*D*? Explain your reasoning.

9. Can you draw a conclusion about the other two angles A and C? If so, explain your findings.

10. Draw a new parallelogram using the following measurements: all four sides having lengths of 3 inches, two angles that measure 50^0 and two angles with measures of 130^0. Draw the diagonals to discover congruency as with the above parallelogram.

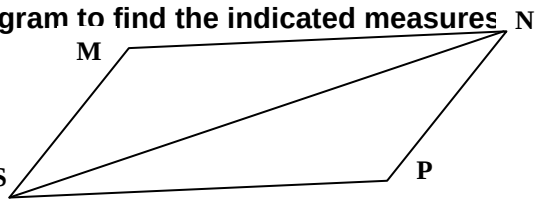




Each shape in the diagram has to properties of the shapes linked above it.

Parallelograms

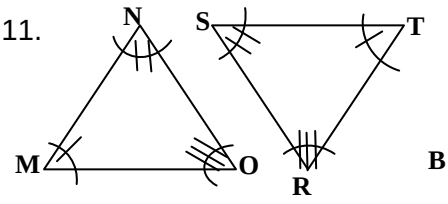
For the following exercises, use the labeled parallelogram to find the indicated measures



1. Given $MN=2t$ and $SP=(t+5)$, find MN. _____
2. Given $m<M=45^0$, $m<P=3x^0$, and $NP=x$, find NP. _____
3. Given $m<MSP=5x^0$ and $m<P=x^0$, find $m<MNP$. _____
4. Given $m<P=55^0$, $m<M=(x+5)^0$, and $NS=(x-15)$, find NS. _____
5. Given $m<M=(x+20)^0$ and $m<MNP=(2x+10)^0$, find $m<M$. _____
6. Given $m<MNS=(5x+10)^0$ and $m<NSP=(x+30)^0$, find $m<MNS$. _____
7. Given $MN=3x$, $SP=(40-x)$, and $MS=2x$, find NP. _____
8. Given $m<P=80^0$, find $m<MNP$._____
9. Given $m<MNP=120^0$, $m<MSP=6x^0$, and $NS=(x-15)$, find NS. _____
10. Given $MS=15$, $NP=(x-5)$, and $m<P=x^0$, find $m<M$. _____

Explain whether each pair of triangles can fit together to form a parallelogram. Justify your answers.

11.



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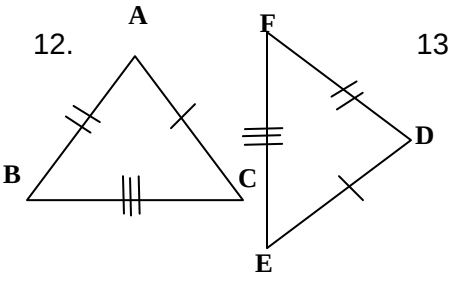

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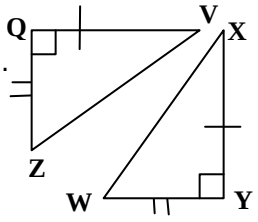


_____ _____ _____

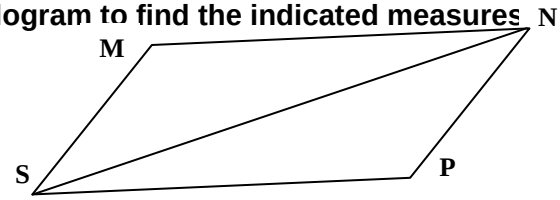
_____ _____ _____

_____ _____ _____

_____ _____ _____

Parallelograms Answers

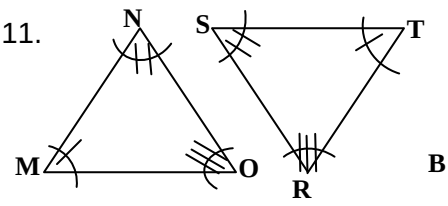
For the following exercises, use the labeled parallelogram to find the indicated measures



1. Given $MN=2t$ and $SP=(t+5)$, find MN. ___10___
2. Given $m<M=45^0$, $m<P=3x^0$, and $NP=x$, find NP. ___15__
3. Given $m<MSP=5x^0$ and $m<P=x^0$, find $m<MNP$. ___150^0_
4. Given $m<P=55^0$, $m<M=(x+5)^0$, and $NS=(x-15)$, find NS. ___35__
5. Given $m<M=(x+20)^0$ and $m<MNP=(2x+10)^0$, find $m<M$. ___70^0_
6. Given $m<MNS=(5x+10)^0$ and $m<NSP=(x+30)^0$, find $m<MNS$. ____35^0__
7. Given $MN=3x$, $SP=(40-x)$, and $MS=2x$, find NP. _____20_
8. Given $m<P=80^0$, find $m<MNP$.___100^0__
9. Given $m<MNP=120^0$, $m<MSP=6x^0$, and $NS=(x-15)$, find NS. ___5____
10. Given $MS=15$, $NP=(x-5)$, and $m<P=x^0$, find $m<M$. ___20^0___

Explain whether each pair of triangles can fit together to form a parallelogram. Justify your answers.

11.



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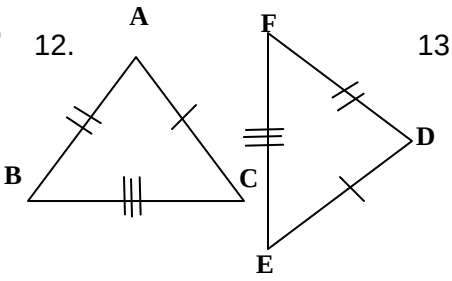

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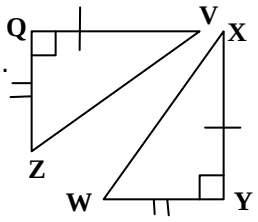


Answers on next page

11 .MNO cannot fit together with SRT to form a parallelogram because they do not have a pair of congruent sides.

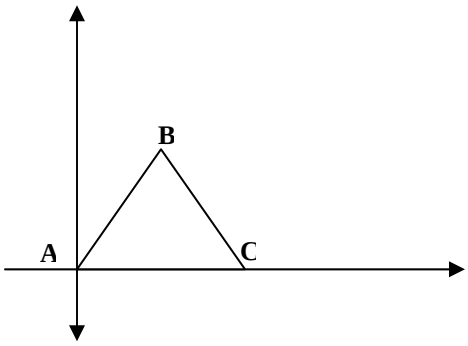
12. ABC is congruent to DFE by SSS, so they can fit together to form a parallelogram.

13. WXY is congruent to ZVQ by HL, so they can fit together to form a parallelogram

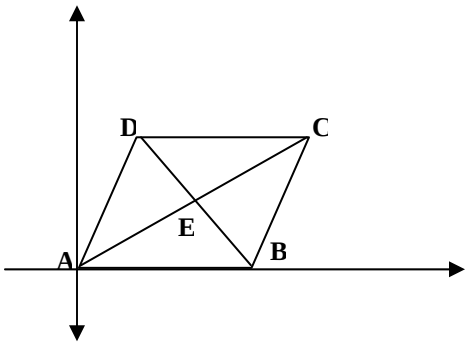
Using Coordinate Geometry

Determine the coordinates of the unknown vertex or vertices of each figure below. Use variables if necessary.

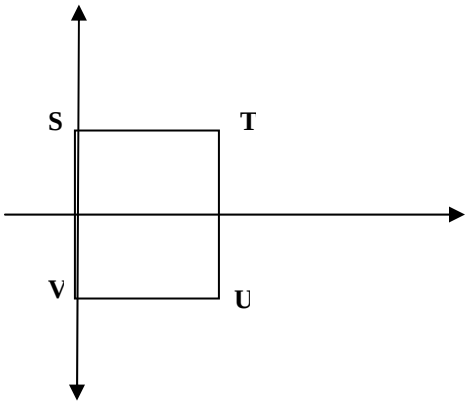
1. Isosceles triangle ABC with $\overline{AB} \cong \overline{CB}$
   $A(0,0), B(4,5), C(\_,\_)$



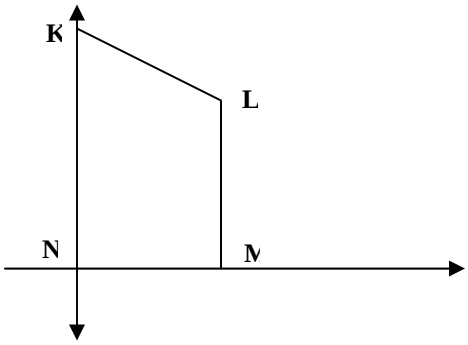
2. Parallelogram $ABCD$
   $A(0,0), B(a,0), C(\_,\_), D(b,c), E(\_,\_)$



3. Square $STUV$
   $S(0,a), T(\_,\_), U(\_,\_), V(0,-a)$



4. Trapezoid $KLMN$
   $K(\_,\_), L(a,b), M(\_,\_), N(0,0)$



Using Coordinate Geometry answers

Determine the coordinates of the unknown vertex or vertices of each figure below. Use variables if necessary.

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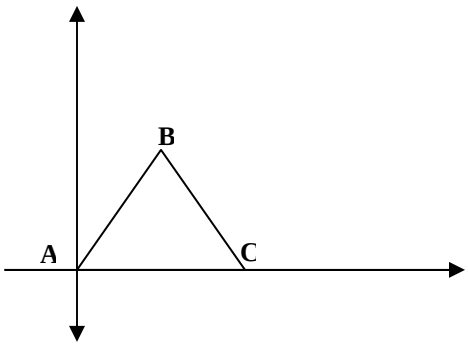
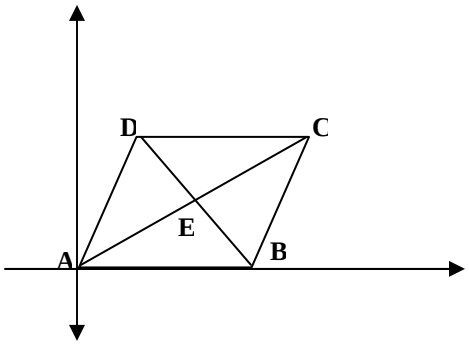
   $A(0,0), B(4,5), C(\_,\_)$



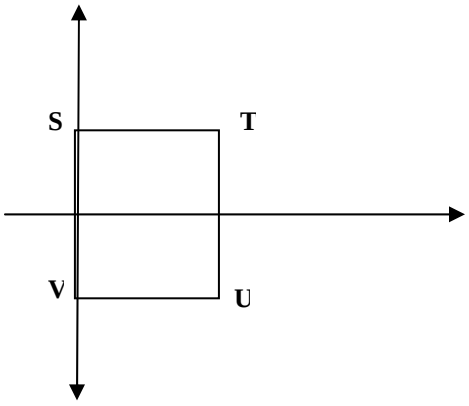
C(8,0)

2. Parallelogram $ABCD$
   $A(0,0), B(a,0), C(\_,\_), D(b,c), E(\_,\_)$



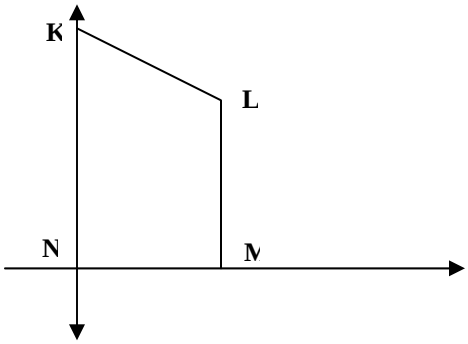
$C(a+b,c), E(\frac{a+b}{2},\frac{c}{2})$

3. Square $STUV$
   $S(0,a), T(\_,\_), U(\_,\_), V(0,-a)$



T(2a,a),U(2a,-a)

4. Trapezoid $KLMN$
   $K(\_,\_), L(a,b), M(\_,\_), N(0,0)$



K)0,c),M(a,0)

Acquisition Lesson Planning Form
Math I, Unit 6, Concept 3, Lesson 2
2 Sessions

Essential Question Lesson:
How do we verify the properties of a triangle using the distance and the midpoint formula?

Activating Strategies: (Learners Mentally Active)
Three Corners: Each student will be given either an isosceles, scalene or equilateral triangle. There will be three corners one for each type of triangle. Students will be given 15 seconds to move to the corner they think is correct. The pieces should all be the same within their corner. Afterwards we will remind ourselves about the characteristics of a scalene, isosceles, and equilateral triangle in relation to the distance of their sides.

Acceleration/Previewing: (Key Vocabulary)
Triangle, isosceles, scalene, equilateral, midsegment, parallel, slope

Teaching Strategies: (Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)

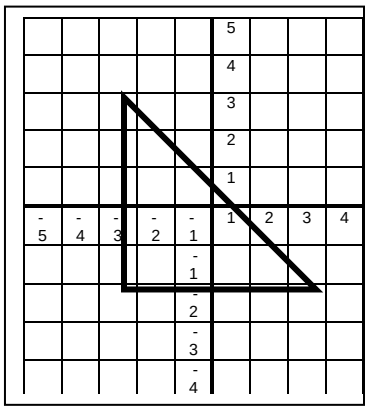
Triangles Verified Graphic Organizer (Located Below)

- Find the midpoint of line segment AC. Label it B.
- Find the midpoint of line segment CE. Label it D.
- Find the midpoint of line segment EA. Label it F.
- Now find the distance between each pair of points. What do you notice? Are the 4 triangles congruent? Why or why not?
- What else do you notice? Line AC and Line FD are parallel. How do you know they are parallel? Prove they are parallel using slope. Are there any other parallel lines?
- Do you notice anything else? The Line FD is half of the distance of Line AC. Does this occur any where else?
- Conclusion: When 3 midsegments are drawn from the midpoints of the three sides of a triangle it forms four congruent triangles, the midsegment is half of the base in distance and are parallel lines.

Coordinate Geometry Flip Book

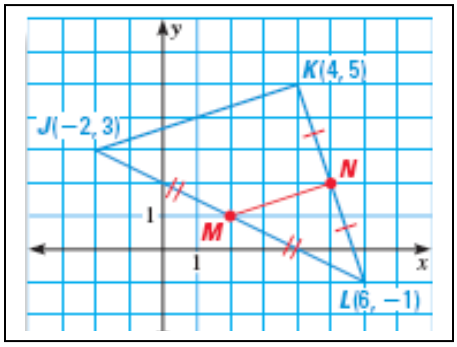
- We will create a flip book consisting of 7 tabs. The first two will have two Triangle Verification problems. The last 5 will be used in the next lesson.

- Example 1:



Label the triangle. Then find the midpoint between each end point. Next, find the distance of each segment. Are the four triangles formed congruent? How do you know?

- Example 2:



Verify that the midsegment MN is parallel and half the distance of the base JK.

Is this triangle an isosceles, scalene, or equilateral? How do you know?

Distributed Guided Practice/Summarizing Prompts: (Prompts Designed to Initiate Periodic Practice or Summarizing)

Practice and Drill:

- Use the appropriate textbook for additional student practice as needed. For example, Georgia High School Mathematics 1 by McDougal Littell Exercises 4.8 and 5.1

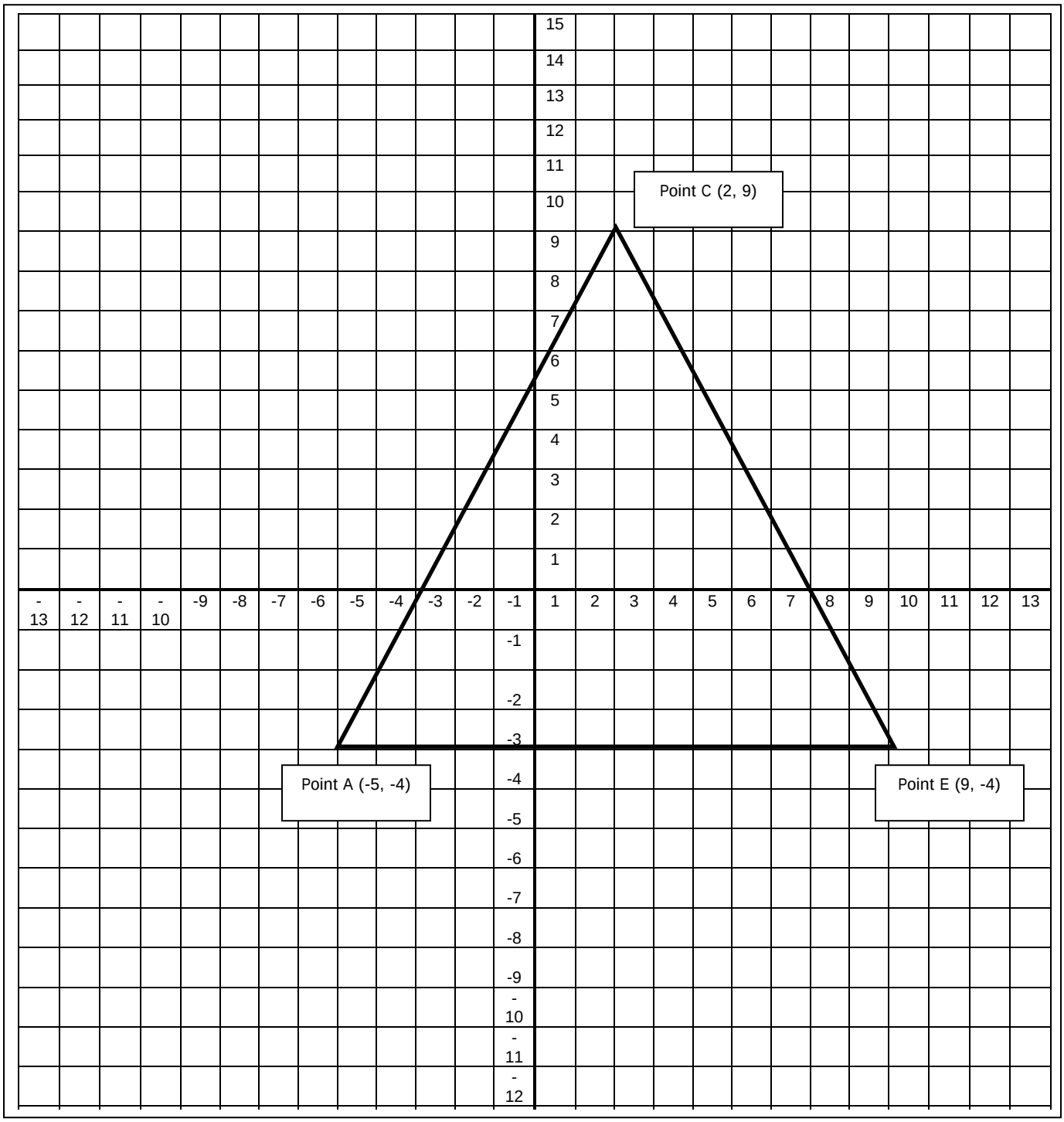
Summarizing Prompts:

- Use turn to your neighbor throughout to have the students repeat the three main concepts in the lesson.
- Divide the class into groups of 2-3 for their practice. Then have each group and teach the class how to do one problem from the guided practice.

Summarizing Strategies: Learners Summarize & Answer Essential Question

3- What are the three concepts we learned throughout the lesson?
2- Write two test questions pertaining to the material you have learned?
1- What is one thing you could teach someone else?

Triangles Verified



Math I, Unit 6, Concept 3, Lesson III
3 Sessions

Essential Question Lesson:
When measuring the slopes, midpoints, and lengths of the sides and diagonals of quadrilaterals, what can I notice about the triangles formed by the diagonals?

Activating Strategies: (Learners Mentally Active)
Recall congruence properties of triangles (SSS, ASA, AAS, SAS,HL, Not Possible) - 6 Corners activity: Teacher will prepare several pairs of triangles on overhead, Smartboard, poster board, etc. Some triangles should be provable by the congruence postulates/theorems, and others should not be able to be proven congruent based on the above postulates/theorems. Teacher will hold up a pair of triangles and students will move to corner of the room that displays the postulate/theorem that proves the triangles congruent or the "Not Possible" corner if the triangles cannot be proven congruent. Do this for several triangles.

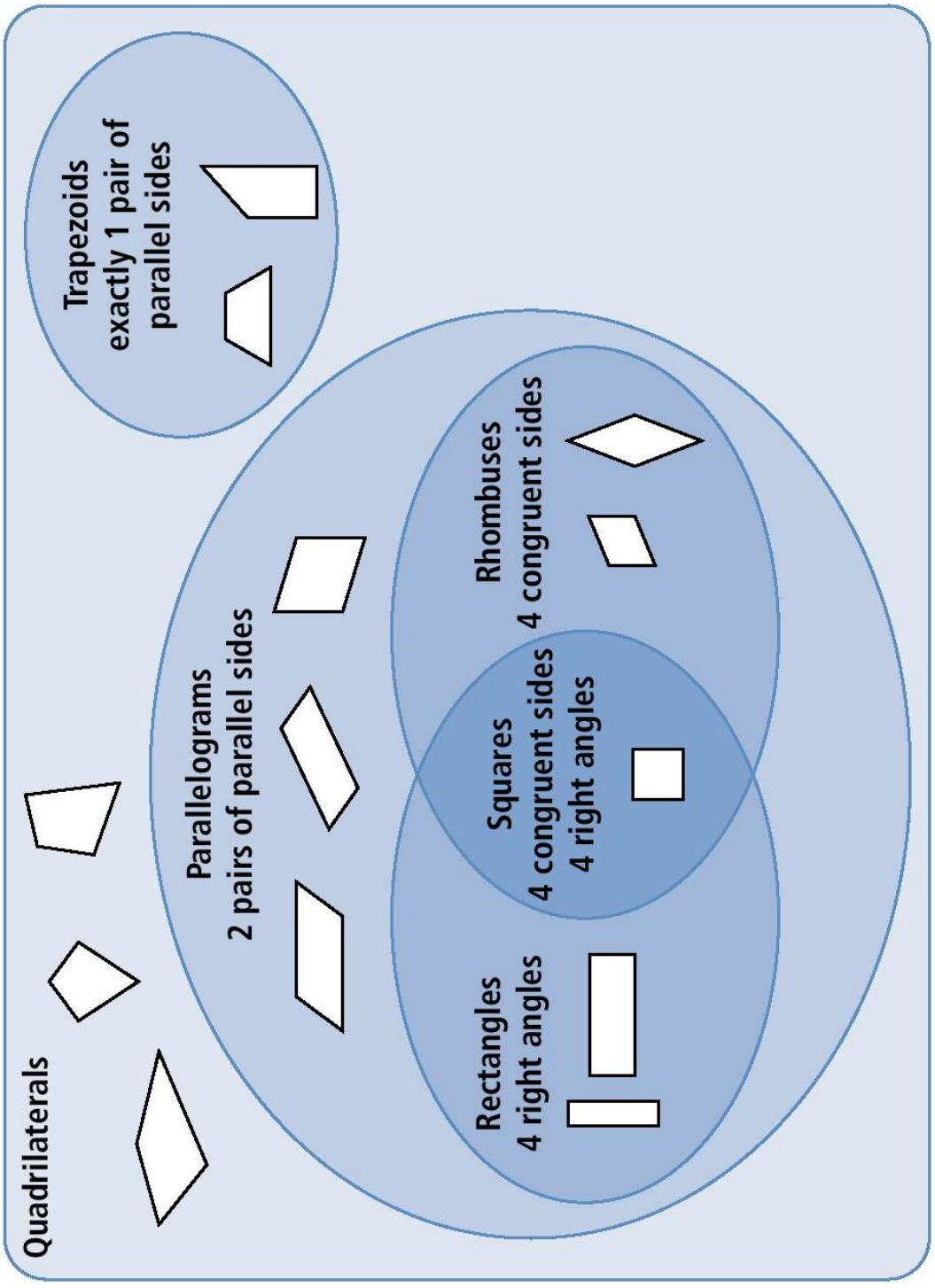
Acceleration/Previewing: (Key Vocabulary)
Triangle, congruence, SSS, SAS, ASA, AAS, HL, Diagonal, Slope, Length
Practice website (remediation): www.mathwarehouse.com/coordinate-geometry

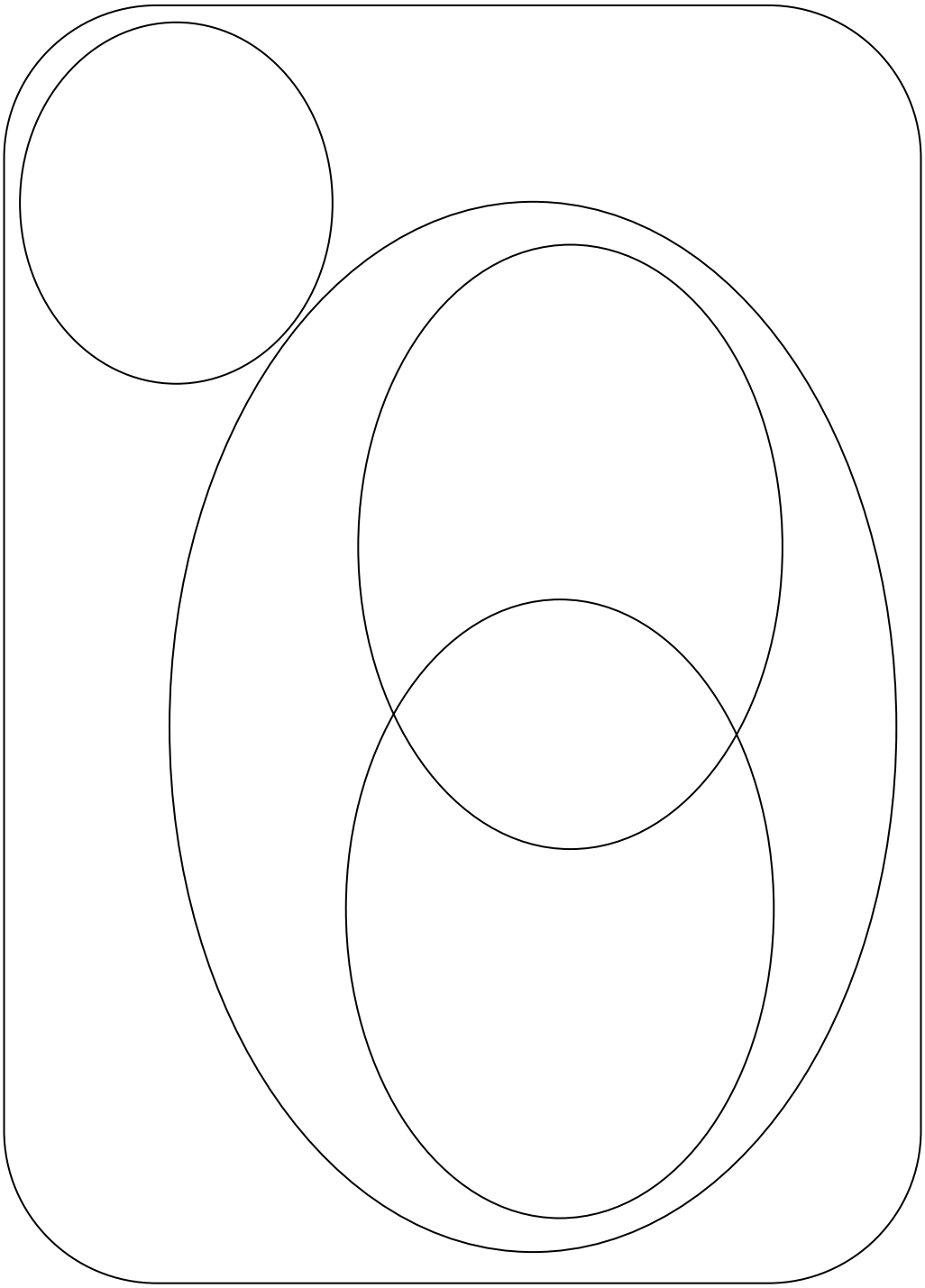
Teaching Strategies: (Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)

1. (GO) Quadrilaterals Venn Diagram (Blank and Complete)
2. Have Students Complete Quadrilaterals Venn Diagram so they may get a visual of relationships of various quadrilaterals.
3. (GO) Triangle Congruence Chart - Review
4. (GO) Coordinate Geometry Flipbook (Remaining 5 pages created in Lesson 2)
5. Using Coordinate Geometry Flipbook, use remaining five pages of flipbook to answer the five activities contained in the following Quadrilaterals Revisited learning task.
6. (Pairs, Handout) Quadrilaterals Revisited learning task
7. (Pairs, Flipbook) Add to each quadrilateral in flip book which pairs of triangles will always be congruent when created by the two diagonals of parallelograms.

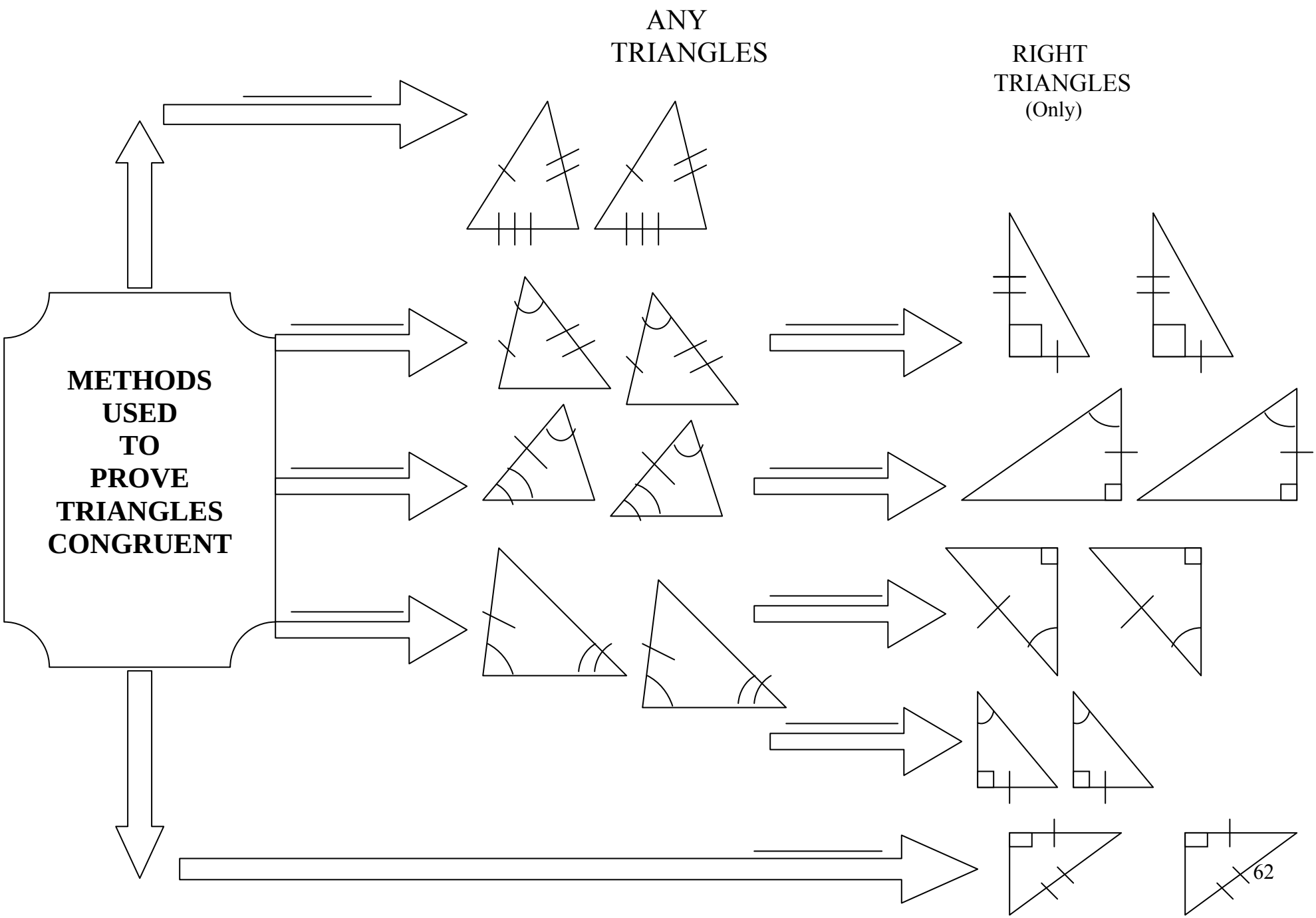
Distributed Guided Practice/Summarizing Prompts: (Prompts Designed to Initiate Periodic Practice or Summarizing)
Homework Assignment: Assign each student two of the quadrilaterals investigated earlier. This can be done randomly or by teacher's choice. Have them come up with ordered pairs on a coordinate plane that when connected will form the assigned quadrilaterals and prove mathematically the properties discovered in the "Quadrilaterals revisited" activity. When they return the next day, they will trade with a partner and prove each other's quadrilaterals' properties.

Summarizing Strategies: Learners Summarize & Answer Essential Question
3-2-1 Activity/Ticket Out the Door: When students leave, have them list 3 quadrilaterals whose opposite triangles formed by the diagonals are congruent, 2 quadrilaterals whose opposite triangles formed by the diagonals are congruent and right, and 1 quadrilateral whose triangles formed by the diagonals are all congruent.

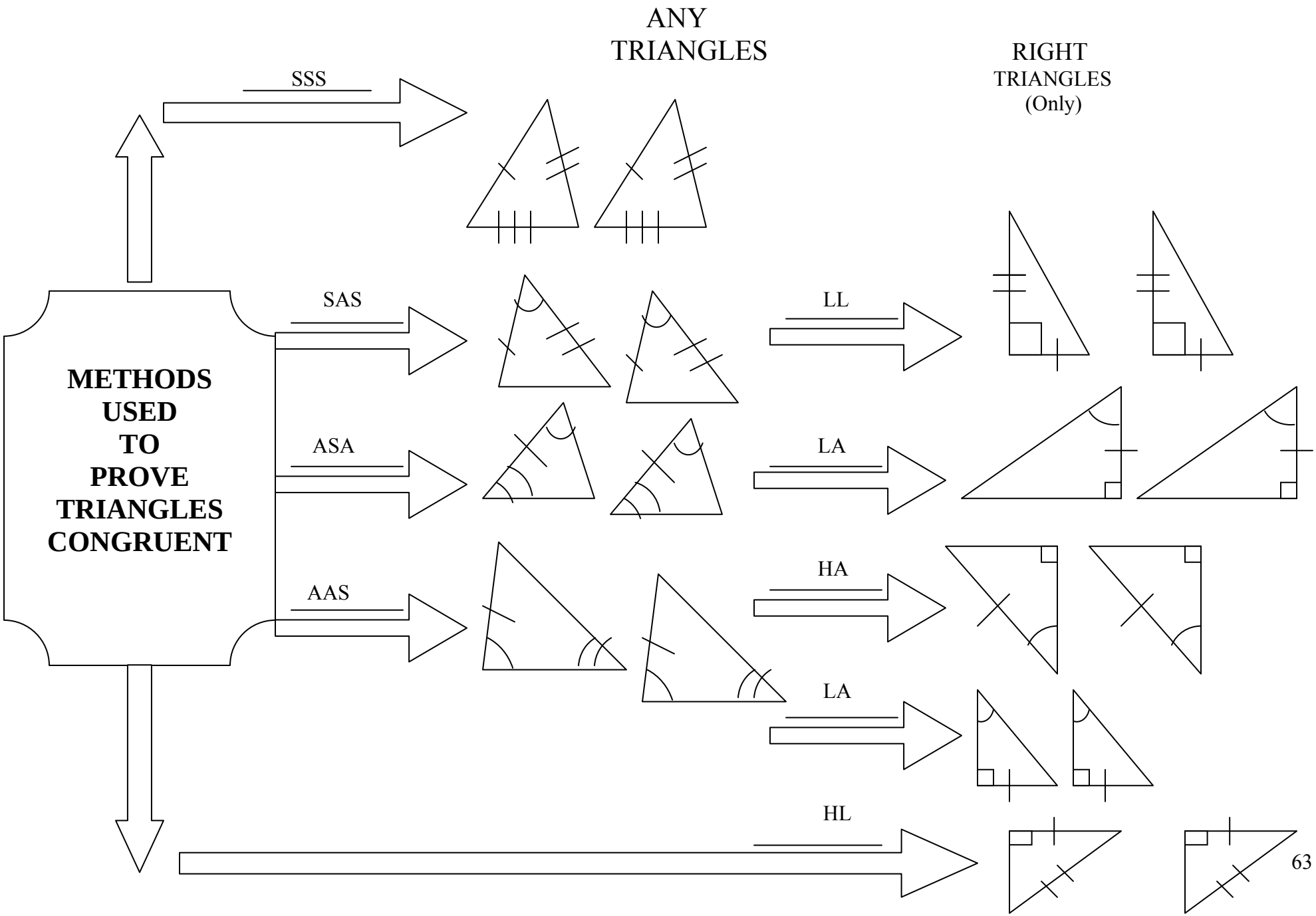

Quadrilaterals
Trapezoids
exactly 1 pair of
parallel sides
Parallelograms
2 pairs of parallel sides
Rhombuses
4 congruent sides
Squares
4 congruent sides
4 right angles
Rectangles
4 right angles



PROVING TRIANGLES CONGRUENT



PROVING TRIANGLES CONGRUENT



Quadrilaterals Revisited Learning Task

Using the remaining sheets of your flip book complete the following five activities.

Plot points A = (-3, -1), B = (-1, 2), C = (4, 2), and D = (2, -1).

1. What specialized geometric figure is quadrilateral ABCD? Support your answer mathematically.

2. Draw the diagonals of ABCD. Find the coordinates of the midpoint of each diagonal. What do you notice?

3. Find the slopes of the diagonals of ABCD. What do you notice?

4. The diagonals of ABCD create four small triangles. Are any of these triangles congruent to any of the others? Why or why not?

Plot points E = (1, 2), F = (2, 5), G = (4, 3) and H = (5, 6).

5. What specialized geometric figure is quadrilateral EFHG? Support your answer mathematically using two different methods.

6. Draw the diagonals of EFHG. Find the coordinates of the midpoint of each diagonal. What do you notice?

7. Find the slopes of the diagonals of EFHG. What do you notice?

8. The diagonals of EFHG create four small triangles. Are any of these triangles congruent to any of the others? Why or why not?

Plot points P = (4, 1), W = (-2, 3), M = (2,-5), and K = (-6, -4).

9. What specialized geometric figure is quadrilateral PWKM? Support your answer mathematically.

10. Draw the diagonals of PWKM. Find the coordinates of the midpoint of each diagonal. What do you notice?

11. Find the lengths of the diagonals of PWKM. What do you notice?

12. Find the slopes of the diagonals of PWKM. What do you notice?

13. The diagonals of ABCD create four small triangles. Are any of these triangles congruent to any of the others? Why or why not?

Plot points A = (1, 0), B = (-1, 2), and C = (2, 5).

14. Find the coordinates of a fourth point D that would make ABCD a rectangle. Justify that ABCD is a rectangle.

15. Find the coordinates of a fourth point D that would make ABCD a parallelogram that is not also a rectangle. Justify that ABCD is a parallelogram but is not a rectangle.

Plot points W = (-2, 4), X = (4, 2), Y = (2, -4), Z = (-4, -2)

16. Draw the diagonals of WXYZ. Find the coordinates of the midpoint of each diagonal. What do you notice?

17. Find the lengths of the diagonals of WXYZ. What do you notice?

18. Find the slopes of the diagonals of WXYZ. What do you notice?

19. The diagonals of WXYZ create four small triangles. Are any of these triangles congruent to any of the others? Why or why not?

MATH 1 ASSESSMENT
Unit 6 Post Test
Coordinate Geometry

1. Use points A(5,1), B(5,6), C(1,4), D(4,-2) to determine which of the following is true.

A. AC=AB
B. AB=BC
C. AB=BD
D. BC=CD

2. Find the coordinates of the midpoint of a segment with given endpoints J(-4,3) and K(6,-9).

A. (5,6)
B. (1,-3)
C. (-3,1)
D. (2,-6)

3. Use the distance formula to find the distance between the points (4,1) and (12,4).

A. 8.5
B. 16.8
C. 11
D. 52

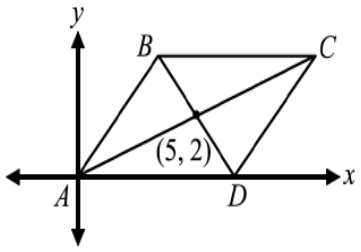
4. Find the coordinates of the other endpoint of a segment with an endpoint of X(13,5) and midpoint M(8,3).

A. (3,1)
B. (18,7)
C. (18,1)
D. (3,7)

5. An open area at a local high school is in the shape of a quadrilateral. Two sidewalks crisscross this open area as diagonals of the quadrilateral. If the walkways cross at their midpoints and the walkways are equal in length, what is the shape of the open area?

A. parallelogram
B. rhombus
C. rectangle
D. trapezoid

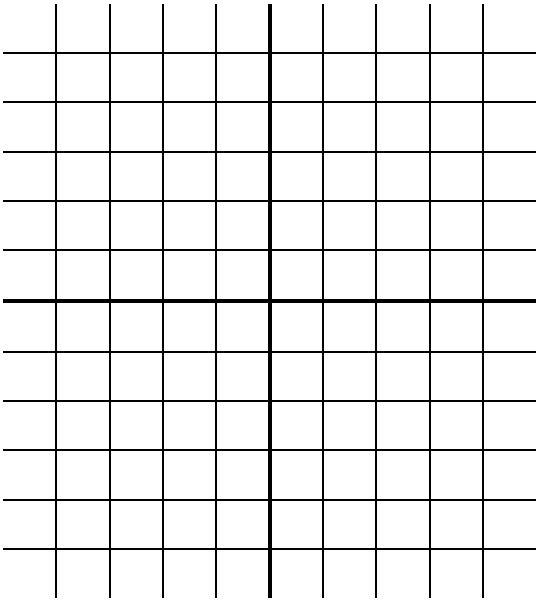
6 In the figure below, the diagonals of parallelogram *ABCD* intersect at (5, 2).



What are the coordinates of point *C*?

A (7, 3)
B (8, 3)
C (9, 4)
D (10, 4)

7. An airplane is 2 km east and 4 km north of the airport, while a 2nd airplane is 5 km east and 3 km south. Use your knowledge of coordinate geometry to find the distance between the airplanes.



A. $10\sqrt{2}$
B. 10
C. $2\sqrt{10}$
D. $\sqrt{58}$

Determine if the following statements are always, sometimes or never true.

8. The distance between two points is negative.

_____

9. If point A lies in quadrant II and point B lies in quadrant III, the midpoint of $\overline{AB}$ lies on the x-axis.

_____

10. The diagonals of a quadrilateral share a common midpoint. _____

11. The midpoint of $\overline{AB}$ is between points A and B.

_____

12. To find the distance between a point and a line, you must first find a perpendicular segment connecting the point and the line.

_____

Answer problems 13 – 19 completely. Justify your answers mathematically.

13. Find the distance between each pair of points.

a. (4, 9) and (2, -8)

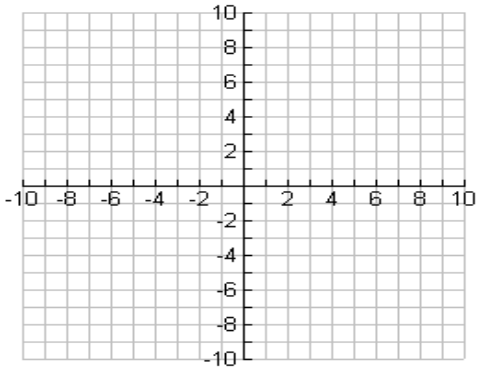
b. (a, b) and (c, d)

14. Find the midpoint of a segment with each pair of endpoints.

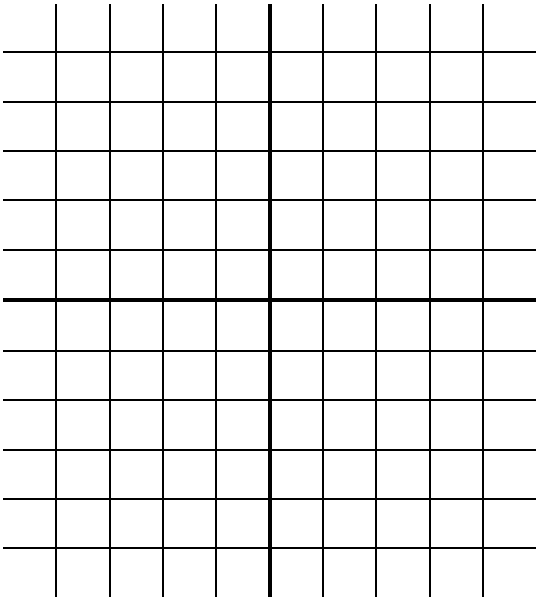
a. (-3, 6) and (7, 11)

b. (h, j) and (k, p)

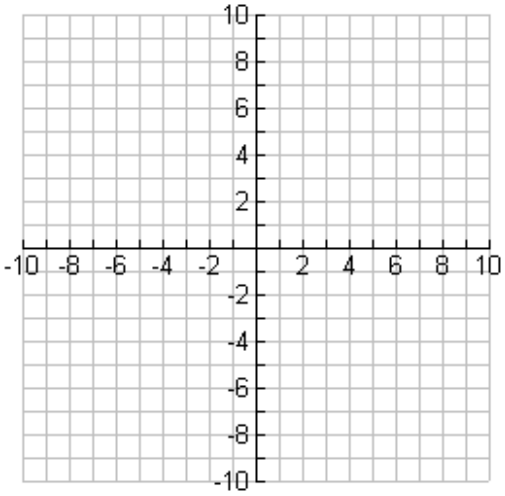
15. Point M is the midpoint of $\overline{AB}$. Given point A at (-1, 2) and point M at (5, 4), find the coordinates of point B. Find the length of $\overline{AB}$. Verify your results using the grid to the below and patty paper.



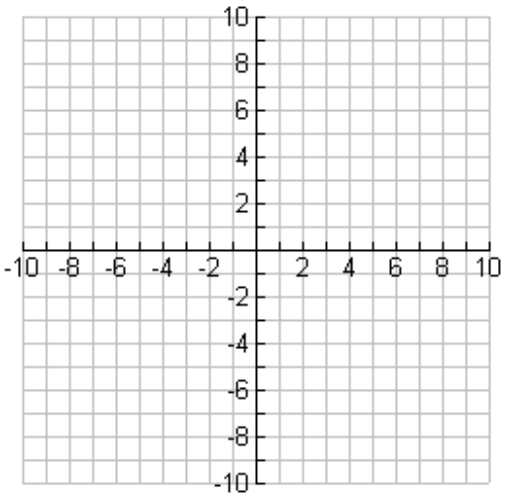
16. Explain the relationship between the Pythagorean Theorem and the Distance Formula.



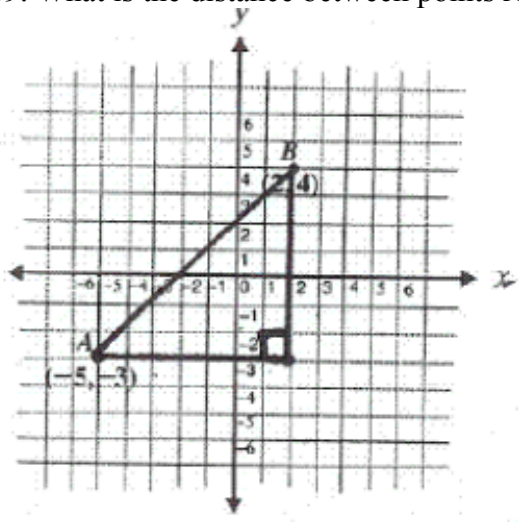
17. Plot points A (0, 2), B (2, -2), C(5, 2) and D (3, 6). Classify quadrilateral ABCD as specifically as possible. Support your answer mathematically.



18. Plot ΔABC with points A (1, 2), B(8, 1) and C (4, -2). Determine the coordinates of the midpoints of the three sides of the triangle. Plot the midpoints and label the midpoints D, E, and F. What relationships are evident between the figures? Support your answer(s) mathematically.

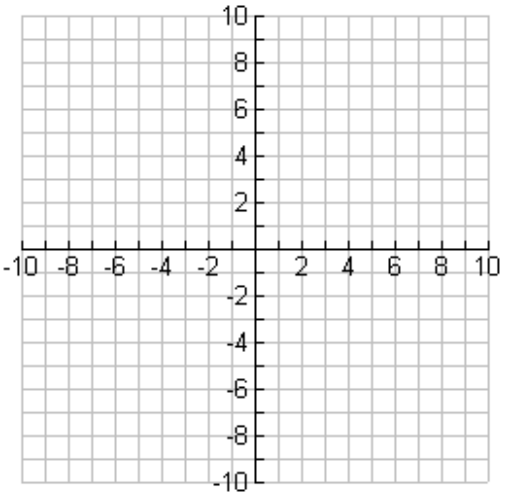


19. What is the distance between points A and B?



A. $7\sqrt{2}$
B. $\sqrt{106}$
C. 7
D. $\sqrt{10}$

20. Farmer Joe lives 3 miles east and 1 mile north of the town of Smallville at (0,0). Hazeltown is located 1 mile west and 1 mile south of Smallville and BooCity is located 1 mile east and 5 miles north of Smallville. What is the shortest distance between Farmer Joe's house and the highway between Hazeltown and BooCity?



Unit 6 Assessment Alignment

Key Standards Addressed:
MM1G1a,b,c,d,e

Standard	Assessment Items
a	1, 3, 7, 8, 13a, 13b, 15, 19
b	12, 20
c	2, 4, 6, 9, 11, 14a, 14b, 15, 18
d	16, 19
e	5, 10, 17, 18